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ABSTRACT

The purpose of this 1976 conference was to explore the potential of using communications technology to provide improved social and commercial services and entertainment to rural areas. Seventy-four invited participants (local, state and Federal officials, commercial telecommunications company executives, rural cooperative officials, and US and Canadian telecommunications experts) commented on an earlier Office of Technology Assessment report entitled "The Feasibility and Value of Broadband Communications in Rural Areas", and (in three panels) considered rural development and communications; technology, economics, and services; and Federal policy. Out of five policy alternatives considered, the conference recommended that the president form an interagency committee to plan a system demonstration program to test the economic viability of and demand for communications systems in rural areas. An overriding concern was that needs should govern technology. Panels specified, among other things, that the demonstration program should address economic issues and realities, be structured to respond to locally generated conceptions of needs, and be conducted with solid community involvement. Discussions on service applications were divided into public (health, education, law enforcement, governmental and administrative) and commercial services (security systems, information and data transmission, pay TV). (RS)

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# COMMUNICATIONS AND RURAL AMERICA

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PREPARED AT THE REQUEST OF

Hon. WARREN G. MAGNUSON, *Chairman*

COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

PRINTED FOR THE USE OF THE

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## LETTER OF TRANSMITTAL

U.S. SENATE,
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION,
*Washington, D.C., January 2, 1978.*

DEAR COLLEAGUE: A Conference on Communications and Rural America was held November 15 to 17, 1976 in Washington, D.C. The Conference was organized by the Office of Technology Assessment (OTA) and cosponsored by the Aspen Institute for Humanistic Studies and the National Rural Center. The purposes of the Conference was to review and comment upon an earlier report prepared by OTA entitled "The Feasibility and Value of Broadband Communications in Rural Areas." The OTA report and the subsequent Conference explored the potential of using communications technology to provide improved social and commercial services, as well as entertainment, in rural areas.

The Conference participants were organized in three panels which considered the topics of rural development and communications; technology, economics and services; and Federal policy. All panelists discussed whether system demonstrations should be undertaken to test the economic viability of and demand for communications systems in rural areas.

I wish to emphasize that the conclusions incorporated in this report have not been approved, disapproved, or considered by the Senate Committee on Commerce, Science, and Transportation.

WARREN G. MAGNUSON,
*Chairman, Committee on Commerce, Science, and Transportation.*

## PREFACE

This report summarizes the results of a Conference on Communications and Rural America held in Washington, D.C., on November 15 to 17, 1976. The Conference was convened by the Office of Technology Assessment (OTA) at the request of Senator Herman E. Talmadge, chairman of the U.S. Senate Committee on Agriculture and Forestry and Senator Warren G. Magnuson, chairman of the U.S. Senate Committee on Commerce. The purpose of the Conference, as stated in the requests from these committees, was to evaluate and comment upon an earlier report prepared by the Office entitled "The Feasibility and Value of Broadband Communications in Rural Areas."

Joining OTA as cosponsors of the Conference were the Aspen Institute for Humanistic Studies and the National Rural Center. The Office appreciates the assistance of these institutions and thanks them for their participation.

The Office of Technology Assessment staff members responsible for this report were William Mills and Gretchen Kolsrud. Special thanks for his assistance in preparing for the Conference and writing this report are expressed to consultant, Ralph Lee Smith.

Major findings set forth in this document have been reviewed by the Panel chairmen and rapporteurs of the Conference on Communications and Rural America. These individuals are listed below.

Panel I. Rural Development and Communications:

- Dr. John A. Gronouski—Panel chairman, professor of public affairs, Lyndon B. Johnson School of Public Affairs, University of Texas, Austin, Tex.
- Mr. Ray Marshall—Panel rapporteur, president, National Rural Center, Washington, D.C.

Panel II. Technology, Economics, and Services:

- Dr. Leland Johnson—Panel chairman, director, communications policy program, Rand Corp., Santa Monica, Calif.
- Dr. William Lucas—Panel rapporteur, senior social scientist, Rand Corp., Washington, D.C.

Panel III. Federal Policy:

- Mr. Glen Robinson—Panel chairman, program on communications and society, Aspen Institute for Humanistic Studies, Washington, D.C.
- Mr. Henry Goldberg—Panel rapporteur, Verner, Liipfert, Bernhard, McPherson & Alexander, Washington, D.C.



J. W. Black

Panel IV. Overview and synthesis: Conference consideration of policy alternatives:

Mr. Roland S. Homet, Jr., director, program on communications and society, Aspen Institute for Humanistic Studies, Washington, D.C.

The Office of Technology Assessment expresses its thanks to these individuals for their skill in moderating the Conference and their review of those chapters covering their areas of expertise.

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# CHAPTER I

## OVERVIEW AND SUMMARY OF FINDINGS

### Background

In his first letter to the Office of Technology Assessment (OTA), Senator Herman Talmadge, chairman of the U.S. Senate Committee on Agriculture and Forestry, expressed his concern for "equity for rural people" and asked that OTA consider undertaking a project to determine the feasibility and value of using broadband communications, such as cable TV and communications satellites, to provide public services for rural areas. Senator Talmadge further indicated his interest in the contribution broadband communications might make to the broad objectives of "rural community development." (The letter from Senator Talmadge is contained in Appendix A, page 45.)

The initial response of the Office to the request from Senator Talmadge was a staff study, the findings of which were summarized in a report issued in April 1976, and entitled "The Feasibility and Value of Broadband Communications in Rural Areas" (hereafter referred to as the Preliminary Report). The Preliminary Report explores past and present migration patterns between rural and urban areas, the needs of rural people, the potential for broadband communications technology to meet rural needs, and constraints to bringing broadband communications to rural America.

### Preliminary Report Findings

A major element in the Preliminary Report was the suggestion that broadband communications systems might be economically viable in many rural areas provided they were designed and constructed to serve a number of different purposes, including public and commercial uses as well as conventional television entertainment. By serving many needs, it was hypothesized that communications systems could attract revenue from many sources, thereby providing economic viability not possible with a single-service communications system.

The Preliminary Report stressed, however, that insufficient economic data are available to judge the viability of such multiuse systems. Practical applications to date have been directed principally at testing technical feasibility rather than economic viability. Therefore, the Report suggested that a series of system demonstrations be undertaken to provide an expanded base of economic data for Federal decision-making.

### Conference Organization

In view of the preliminary nature of the initial study and the need to expose these findings to further discussion and exploration, the

Report suggested that a conference of experts be convened. Senator Talmadge requested that such a conference be held. Subsequently, Senator John O. Pastore, chairman of the Subcommittee on Communications of the U.S. Senate Committee on Commerce, accepted Senator Talmadge's invitation for his subcommittee to join with the Agriculture Committee in supporting the meeting.

The Conference was held in Washington, D.C., on November 15 to 17, 1976. There were 74 invited participants, including Federal, State, and local officials, executives of commercial telecommunications companies, officials of rural cooperatives and other rural organizations, and telecommunications experts from the United States and Canada. Additional interested persons attended to listen to the debate among participants.

The Conference was divided into three Panels, with each Panel covering a major subject area of the Conference. The three Panels and their chairmen and rapporteurs were:

- Panel I. Rural Development and Communications
  Chairman: Dr. John A. Gronouski
  Rapporteur: Mr. Ray Marshall
- Panel II. Technology, Economics, and Services
  Chairman: Dr. Leland Johnson
  Rapporteur: Dr. William Lucas
- Panel III. Federal Policy
  Chairman: Mr. Glen Robinson
  Rapporteur: Mr. Henry Goldberg

Two organizations joined the Office of Technology Assessment, each taking special responsibility for one of the Panels. The National Rural Center sponsored Panel I (Rural Development and Communications), and the Aspen Institute for Humanistic Studies cosponsored Panel III (Federal Policy).

Each participant was assigned to one of the three Panels which met during the first 2 days of the Conference. [The participants are listed after the preface.] Conferees were asked to assist the Office and the Congress in three ways:

- Broadening the scope of the study. The Preliminary Report focused on broadband systems, particularly cable and supplementary microwave links. Panelists were asked to broaden the coverage to include all communications technologies, both broad and narrowband.
- Assessing rural interests and Federal policy. At issue here was whether rural interests and needs are adequately reflected in existing Federal policy and if not, what might be done to achieve a better balance.
- Commenting upon the concept of system demonstrations. Panels were asked to consider whether system demonstrations should be undertaken to test the economic viability of multiservice communications systems in rural areas and if so, what types of demonstrations should be undertaken and under whose sponsorship.

Specific tasks and questions were circulated to panelists to assist them in addressing these topics. (These tasks and questions are listed in Appendix B, page 46.) In addition, resource papers were prepared and

distributed to panelists prior to the Conference. (Resource papers are listed in Appendix C, p. 49.) These papers plus the Preliminary Report were used as a point of departure for Conference discussions.

On the third and final day of the Conference, all Panels met together in an Overview and Synthesis Panel chaired by Roland S. Homet, Jr., director of the Aspen Institute Program on Communications and Society. In addition to hearing reports from the chairmen and rapporteurs of each of the Panels, the objectives of the last session were to consider the implications of various telecommunications policy alternatives and to formalize the Conference recommendations.

## Conference Recommendations

In the concluding statement of the Conference plenary session, Chairman Homet stated:

> On the basis of the Panel reports and of the discussion this morning, it seems fair to conclude that the Conference favors a carefully considered but immediately initiated program of demonstration projects. We recommend to Senators Talmadge and Magnuson that they propose to the President the following:
>
> - That he appoint a special adviser on new communications policy;
> - That he form an interagency committee on the coordination of communications policy and that one of its first tasks be to plan a system demonstration program for rural application; and
> - That the nature and conditions of the demonstration program be as specified in this concluding Panel session and as further detailed in the written summaries prepared by each of the three Panel chairmen and rapporteurs.
>
> We recommend to the Senators that they then:
>
> - Establish a schedule of joint oversight committee hearings to monitor the progress of the executive branch in this matter;
> - Request that the planning group in the executive branch develop an inventory of administrative and regulatory obstacles to the demonstration program and present this inventory to the Congress along with draft legislation that would: (*a*) Propose a method for overcoming the obstacles; and (*b*) include appropriate Federal authorizations and appropriations to carry the rural demonstrations for a period of 5 years of actual operation.
>
> If the congressional committees find these recommendations suitable, the Conference further recommends that the Conference Panel members be a source of advice available to the Office of Technology Assessment in its further work, and to the executive branch committee and congressional committees as may be necessary.

## Organization of this Report

The following chapters provide the supporting material for the Conference recommendations. Chapters 2, 3, and 4 synthesize the material developed in the Preliminary Report, papers commissioned for the Conference, and the proceedings of the Conference itself. These chapters are titled to correspond with the three Conference Panels: "Rural Development and Communications"; "Technology, Economics, and Services"; and "Federal Policy." Each of these chapters is divided into two parts. Part I: "Background and Issues" summarizes material that appeared in the Preliminary Report. Part II: "Critique and Commentary" consists of material drawn from the resource papers and the Conference. The fifth and final chapter presents the views of conferees on the policy alternatives, its formal recommendations, and its broad areas of consensus.

# CHAPTER 2

# RURAL DEVELOPMENT AND COMMUNICATIONS

## PART I. BACKGROUND AND ISSUES

### WHAT DOES "RURAL" MEAN?

"Rural" is an elusive term. Areas which most people would agree are rural differ widely in population density, geography, employment opportunities, and other characteristics. In addition, different and often divergent changes are occurring in different areas of rural America. Yet, a working definition was necessary for study purposes.

The U.S. Bureau of the Census provides breakdowns of American population, and a number of other types of statistics by counties, which are then classified as metropolitan and nonmetropolitan.[1] Because many relevant data are gathered by county, the term "rural" was equated with the census term "nonmetropolitan." It should be remembered, of course, that population patterns do not adhere strictly to county lines, nor is it necessary to make communications networks and services conform to county boundaries. Services may be best provided along regional lines, with regions being determined by considerations of geography and population distribution. For analytical purposes, however, the county was taken as the unit in this study.

### POPULATION CHANGES IN RURAL AREAS

Of 3,100 counties in the United States, 630 are urban (metropolitan) and 2,470 are rural (nonmetropolitan). Somewhat more than half the rural counties are not adjacent to metropolitan areas. All rural counties together contain 27 percent of the Nation's population—about 55.9 million people.

Of the many statistics relating to rural population shifts, one stands out. Since 1970, for the first time in the 20th century, there has been a net outflow of the population from urban to rural counties, with the rural areas showing a population gain of 1.6 million.

Contrary to what might be expected, a sizable portion of all persons leaving urban counties have moved to counties that are not adjacent to urban counties. In the period 1970–74, 38 percent of all persons moving

---

[1] Nonmetropolitan or rural counties are those which do not meet the criteria for metropolitan counties. Thus, according to the Bureau of the Census, three types of counties are defined as "metropolitan":

Counties in which there is an urban nucleus of at least 50,000 people;

Counties near or adjacent to the type of county described above, 30 percent or more of whose workers commute to the county having the urban nucleus; and

Counties less than 30 percent but more than 15 percent of whose workers commute to a county having an urban nucleus, that also meet two out of three subsidiary criteria relating to density, degree, or urbanization, and growth rate.

All other counties are classified as nonmetropolitan.



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from urban counties moved to nonadjacent rural counties. This trend has had a sharp impact on population trends in such counties. In the period 1960–70, only 39 percent of nonadjacent rural counties showed a population increase, and the category as a whole experienced a net population decline of 2.5 million. By 1974 the number of nonadjacent rural counties showing a population increase had doubled over the figure of the previous decade; in 1974 that percentage reached the level of 70 percent.

Among the forces underlying these population shifts, the Preliminary Report singled out three as being of key importance:

(1) Decentralization of manufacturing;
(2) Decentralization of the service sector of the economy; and
(3) Residential preference.

Relating these and other forces to the population shifts they helped bring about, the Preliminary Report divided rural counties along the following lines:

- *Turnaround Acceleration.*—This term refers to counties in which growth began in the fifties and accelerated in the sixties. These counties are generally adjacent to metropolitan areas and are characterized by growth in service industries.
- *Turnaround Reversal.*—Counties that have only recently reversed their decline are covered by this term. These areas are generally not adjacent to metropolitan areas, and are characterized by growth in manufacturing industries.
- *Net Decline.*—The number of counties continuing to decline in population continues to decrease. As indicated, the number of nonadjacent counties experiencing growth rose from 39 percent to 70 percent from the last decade to the present. The number of adjacent counties experiencing growth rose from 60 percent to 84 percent during the same period. Counties in a continuing state of population decline, however, represent a special group. Some of the problems in these counties might be addressed through telecommunications.

### RURAL CHANGE AND COMMUNICATIONS

In any rural county, the Preliminary Report said, full development of all possible uses and services will be necessary if a communications system is to produce enough revenue to be economically viable. However, different emphasis in the application of communication technologies might be appropriate for each of the three types of rural counties. Thus, in addition to the basic requirement that revenue be generated through the sale of entertainment services, the following possible system configurations were suggested:

- *In Turnaround Acceleration counties.*—Those characterized by growth in service industries—business and commercial applications might offer a significant source of revenue. Systems incorporating the delivery of these services might facilitate greater dispersal of service-type industries to rural areas.
- *In Turnaround Reversal counties.*—Those characterized by growth in manufacturing—public services may constitute the best source of additional revenue. In addition, the systems, once opera-

tional, can provide the communications network for both the support of present business activity and eventual growth of the service sector if economic conditions permit.

- *In Declining counties.*—Improved communications systems could contribute to cost-effective functioning of those Federal and State programs designed to upgrade conditions of life and opportunities and could help attract needed business and industry.

In both types of growing rural counties, broadband communications systems appear to have the potential for becoming self-supporting. Such public assistance as may be required is likely to be in the areas of technical aid and the securing of financing.

In declining counties the economic base may be inadequate to support broadband communications systems. To the extent that Government aid may be available for such purposes as the upgrading of education and community facilities, however, payment could be made to the communications systems for such portions of these functions as they might be called upon to perform, with such funds helping to make overall system operation profitable.

## Part II. Critique and Commentary

### Population Patterns

*Current trend*

Information provided in the papers and at the Conference confirmed the patterns of population movement described in the Preliminary Report.

Calvin L. Beale of the Economic Research Service, U.S. Department of Agriculture, told the conferees that 1975 data so far available show a continuation of the trends found in the period 1970–74. Nonmetro (rural) counties continued to show a greater retention of population than in the fifties and sixties, and net outmigration from major metropolitan areas is continuing.

Between 1970 and 1975 nonmetro areas grew 6.6 percent while metropolitan areas grew by 4.1 percent. The net gain in nonmetro areas in the last 5 years has been at the rate of 350,000 people per year. This is greater than the net annual loss from rural areas in the previous two decades, which was about 300,000 people per year.

The above trend is widespread, affecting every region and subregion of the country. All but two States show increased net retention or greater acquisition of population in their nonmetro areas in the seventies as compared with the sixties. The exceptions are minor; Rhode Island, where the only nonmetro county had a military base closing, and Connecticut, where the State's only two nonmetro counties continued to attract population but at a reduced rate.

*Causes of the trend*

No single cause underlies the trend of nonmetro growth. As pointed out in the Preliminary Report, three stimuli to outmigration are decentralization of manufacturing, decentralization of the service sector, and residential preference. In the sixties, decentralization of manufacturing was a major economic trend. At that time, there was little manufacturing growth nationally, but a substantial shift of plants to

small city or rural locations occurred. This caused dramatic growth in population and jobs in some rural areas. Between 1970 and 1976, however, manufacturing accounted for only 3 percent of nonmetro job growth. Increasingly as in urban areas, growth in service sector jobs is occurring.

With regard to residential preference, many motivations and economic forces are involved. The largest identifiable single group at this time consists of retirees. "Although we all nominally understand that there are more older people than there used to be and that retirement plans have become more generous in both money and age of eligibility," Beale said, "I do not believe we have fully anticipated the potential implications of these developments on population distribution."

The 360 nonmetro counties that could be termed retirement counties grew in total population by 14.5 percent from 1970 to 1974, with a net inmigration of 932,000 people. The inmigration to these counties was more than half of total net inmigration into all nonmetro counties. Retirees as a group have distinctive characteristics including independence of the local economy for income on the one hand, and increased requirements for health care on the other.

After retirement communities, the second most rapidly growing class of nonmetro counties is that group in which State colleges and universities are located. This group grew by 7.1 percent from 1970 to 1974. With the general peaking out of college enrollment rates, however, these counties are likely to contribute less in the future to total urban outflow.

In general, the choices made by urban persons moving to rural retirement or college communities lack the economic urgency that characterizes the choices of those within rural communities, especially the poor. For many generations, real or imagined better job opportunities siphoned off rural people to cities. Even here, however, some change is underway. Now there is an increasing belief among rural residents that the city is no longer the promised land for employment. To the extent that there is any growth of the local job market in rural areas, this disincentive for urban migration is enhanced. As a result, some people who left rural areas for metropolitan centers as many as 10 or 15 years ago are coming back, and an increasing number of rural youth are not leaving.

The conferees cited a number of other statistics and trends relating to patterns of population change and rural needs. Among them:

*"Rural" and "farm".*—Although many people tend to equate the word "rural" with the word "farm," farm population was shown in recent statistical surveys to be only 9 million out of a rural population of 57 million, and farmworkers are only 4 million out of the 30 million rural work force. The agricultural employment base has become so small that changes in it can have relatively little further effect on the total trend of nonmetro population change.

*Outmigration from poor counties.*—Although the total trend of U.S. population distribution shows a shift from net outmigration from rural areas to net inmigration, many of the poorest counties in the South are continuing to experience net outmigration, and the majority of those leaving continue to be black. This trend means not only popu-

lation loss for these counties, but a shift in ethnic composition, with continuing major impacts on both the counties that these people are leaving, and the cities to which many or most of them are going.

At the Conference, Ray Marshall, then president, National Rural Center, and now Secretary of Labor provided additional background. He pointed out that although employment has grown faster in the South than in the rest of the country in recent years, areas with predominantly black population have not shared proportionately in this growth, nor have blacks benefited as much as whites from economic development.

In 1960, according to a paper Marshall prepared for the Conference, there were 244 counties in the South with 5,000 or more black residents. The incidence of poverty in these counties among blacks in that year was 81 percent; among white residents it was 32 percent. In 1960 blacks constituted 40 percent of the population of these counties, but during the same period they accounted for only 16 percent of nonagricultural job growth. In fact, blacks in these counties lost 97,000 jobs (farm and nonfarm) during the sixties while whites gained 287,000 jobs.

By 1970 the incidence of poverty among blacks had dropped to 56 percent, while the incidence of poverty among whites had dropped just slightly, to 30 percent. Among blacks, however, the decline in poverty was not principally due to an improved economic position, but to the simple fact that so many of them had left. "There continues to be heavy black outmigration from these counties," Marshall stated.

*Lower rural income.*—While income levels vary greatly in rural areas, and while inner cities have become heavily afflicted with the problems of poverty, rural income as a whole continues to lag behind urban income. Median incomes of nonmetro families are only 75 percent of those of metro families.

*Growth of small- and medium-sized metropolitan areas.*—The new pattern of outmigration from cities to rural areas has received a good deal of attention. Less attention has been paid to the fact that small- and medium-sized metropolitan areas are showing the same kind of attractiveness as rural areas, and are experiencing the same patterns of growth. Metro areas of less than 750,000 population have had increased net inmigration during the seventies. It is only in metropolitan areas above this size that net outmigration is occurring. This pattern is important to note, indicating as it does that rural areas are not the exclusive choice of persons who no longer wish to live in large metropolitan areas.

*Looking to the future*

The Panelists agreed that increased settlement of rural areas will continue for the immediate future. "The current distribution trend," Beale said, "is real and substantial, and is not just a transient and negligible aberration. It has substantial momentum which seems likely to continue at least into the next decade. I am rather dubious that we could ever go above 60 million rural people, but I think we are now advancing toward such a level."

Beale provided interesting perspectives in explaining that the trend is international in character. Slowdowns in urbanization can be mea-

ured in a number of the technologically advanced nations. When modernization narrows some of the gap that once existed between amenities that people can enjoy in urban and rural settings, and when urbanization has reached the point at which environment and quality of life in urban centers is seriously impaired, the continuing attraction of people to big centers of population seems less likely.

Even with declining fertility rates, Calvin Kytle, president, Calvin Kytle Associates, consulting firm, stated, U.S. population is likely to be 282 million by the year 2000, and will not stabilize until 2025. The question may not be whether rural areas will become more heavily settled, he suggested, but a much simpler one--where else is it anticipated that the additional people might go?

Distribution of resources was cited as one ultimately limiting factor on immigration to certain areas. Kenneth Rainey, of the Academy for Contemporary Problems, noted that in the West, limits on the available water supply may be a more critical factor than energy resources, while natural gas shortages may limit the ability of the Midwest to absorb population.

There was strong agreement among the Panelists that energy problems would affect rural population patterns. On the one hand, increasing need for coal could cause substantially increased employment in those rural areas where coal is mined. On the other hand, an even more pervasive influence could be the availability and cost of gasoline. Rural dwellers use more of it than city dwellers and tend to depend more completely on the automobile for access to nearly all necessities and amenities. High gasoline prices could have a substantial effect in tempering the outflow of population from large metropolitan areas where public transportation is a more viable alternative to the automobile. Increased transportation costs could also affect production and service industry costs in such a way as to tip the balance back in favor of more centralized locations.

Federal intervention in the price of fuel, in such a way as to either hold it down or permit it to rise steeply, would affect rural population patterns. This is equally true of many other areas of Federal activity and decisionmaking. But on the broad question of whether the Federal Government should pursue a deliberate overall policy of either encouraging or inhibiting rural inmigration, there was no consensus among Panel members. Summarizing the group's views, Panel chairman John P. Gronouski, professor of public affairs, Lyndon B. Johnson School of Public Affairs, University of Texas said, "Growth is occurring on its own * * *. The purpose of rural policy should be to stabilize, not to promote or retard growth. There is no reason for the Federal Government to encourage outmigration from urban areas."

### RURAL CHANGE AND TELECOMMUNICATION DEMONSTRATIONS

In its agenda for the Panel, OTA asked the participants to address the following set of questions:

- Is the framework used in the Preliminary Report (Turnaround Acceleration Counties, Turnaround Reversal Counties, and Declining Counties) a useful way to describe what's happening in rural areas?

- Ought there to be subcategories (State college, retirement, small landowner, et cetera) to further describe what's happening in rural areas?
- Would it be useful to organize system demonstrations around the three basic categories of rural counties outlined in the Report?
- How?

These questions engendered much discussion, both in the Conference papers and in the Panel discussion. The consensus of the Panel was perhaps best stated by Beale: That the OTA categories are useful for describing growth patterns, but are inadequate for making decisions on what kinds of counties to choose for demonstration purposes. For making such decisions, additional information would be needed.

The Panelists agreed that clearer and more detailed information on the economic structure of possible candidate sites would be required. William Motes, of the Rural Development Subcommittee, Senate Committee on Agriculture and Forestry, for example, suggested that income levels and the focus of economic activity were essential categories of information.

He also suggested actual geographic location, actual distance from a metropolitan area, and population density as additional types of information that would be necessary in choosing candidate sites. Others agreed, and Rainey said that remoteness and density are basic, and should be built into any category system.

Gronouski suggested that, as an alternative to the OTA categories, the following five classifications of rural counties might be used:

(1) Low density, low income;
(2) Low density, high income;
(3) High density, low income;
(4) High density, high income; and
(5) A category for counties declining in population.

This set of classifications was adopted by the Panel as the recommended schema for selecting demonstration sites.

Marie Cirillo, of the Department of Rural Development, Catholic Diocese of Nashville, added another factor to be considered. Speaking from her viewpoint as a community organizer in a poverty area of Tennessee, she said, "Everything changes when the community is one of chronic poverty. Its substructure functions to meet (the individual's) survival needs." An understanding of this substructure, its psychology, and the way in which it operates, she stated, would be necessary for any successful demonstration in low-income areas.

Various Panelists suggested that useful demonstration projects must be based on some familiarity with the increasing body of knowledge about what does and does not really foster healthy development of rural areas and communities. The Conference paper of Kenneth Rainey contained a warning about naive approaches.

For example, Rainey said, "New manufacturing plants can cost a rural community more than it gains." The community sometimes gives away its taxing potential to attract industry and then must provide facilities to serve it. The labor force may be drawn largely from the fringe of a nearby metropolitan area. "Rather than filtering its needs for equipment supplies, or repairs through smalltown business,"

Rainey stated, "Primary industries—whether agriculture or manufacturing—increasingly go direct to metropolitan outlets. The retail consumer does the same thing, bypassing the smalltown store for the shopping centers." Such patterns, he said, represent "a growing gap between those communities expected to provide public services and their ability to pay for them. It represents increasing ability of some people and organizations to externalize their cost on others." Development of telecommunications applications that reinforce such trends is unlikely to facilitate the well-being of rural communities.

*Criteria for projects*

Addressing OTA's question concerning the "How?" of demonstration projects, the Panelists made numerous comments and suggestions which were then summarized by Chairman Gronouski in a list of criteria that was approved by the Panel. The criteria are as follows:

(1) Possible benefits of demonstration projects must be delineated for the Congress, to assist in the making of relevant decisions and policy.

(2) Financing capability must be available, and must include grants or low interest, long-term loans, both for capital and for operating expense.

(3) There must be early distribution of information to localities through local organizations, so that residents can decide if they want a pilot project in their community.

(4) There should be maximum involvement of local people in planning, organization, and development of the project.

(5) The Federal pilot program should promote ongoing projects, such as that in Trempealeau County, Wis., and in Northern Minnesota.[2]

(6) The Federal agency responsible for administering the pilot projects should consider piggybacking with existing private or cooperative communications systems.

(7) Design and feasibility studies should be done.

(8) Evaluation of these studies should be done by an outside group and this task should be specified in the legislation.

(9) At least five pilot projects should be undertaken, based on the five community categories suggested by the panel.

*Local and community involvement*

Among these recommendations, the Panel placed particular stress on community involvement, as did Panel II in its discussion of the same subject.

Marshall noted that rural people are often or usually not well organized for community action, and suggested that the infrastructure of organization in a rural area might be strengthened through technical and financial assistance as a component of plans leading to successful demonstrations. Among such organizations he cited:

- Cooperatives, especially among low-income farmers and small business men; and

[2] The Trempealeau County project is described elsewhere in the report. As another example, Northwestern Telecommunications, Inc. has designed a 12-county multiservice communication system for northern Minnesota. This system, combining a variety of technologies, would permit delivery of education, law enforcement, physical and mental health, and social services. Funding to implement the system is being sought from several sources.

- Local community development corporations or associations, especially to respond to the development needs of rural people and communities that are not sufficiently served by forces of the marketplace.

Cirillo stated that the two requirements for success of any project would be sharing of responsibility for the project with local people and groups, and, ultimately, some degree of self-sufficiency.

Louis A. Ploch, of the Department of Rural Sociology, University of Maine, stated that flexibility would be required in the funding mechanism, with local groups and agencies perhaps being involved if this can be worked into the structure of the demonstration.

*Addressing rural needs and problems*

On the problems and needs of rural areas that might be addressed by communications technologies, the Panel agreed, first, that many present Federal policies and many of our social institutions have an urban bias, and work to the detriment of rural areas. Marshall cited as examples:

- The health delivery system, with its concentration of experts and facilities in urban centers, its predominant pattern of solo rather than group medical practice, and its emphasis on treating the sick instead of maintaining health;
- Urban bias in the availability of banking facilities and credit;
- An information system about jobs and the labor market that is far stronger and more effective in urban centers; and
- A system of poverty assistance that is geared to the conditions of the urban poor. Most rural poor families are headed by employed males while urban poor families are more likely to be headed by females. Public assistance programs in the United States concentrate heavily on families without fathers, and thus automatically discriminate against rural areas.

For the most part, the Panel left the task of identifying specific services that might be delivered by telecommunications to Panel II. Two service areas, however, received specific mention:

(1) *Medical assistance and health care.*—Obvious applications designed to overcome the urban bias in the present health care system include telecommunications links to decentralized clinics, and updating the knowledge of rurally based general practitioners.

(2) *Vocational education and retraining.*—Alex Mercure, vice president, regional and community affairs, University of New Mexico, noted that there is strong demonstrated demand, with many rural people already traveling long distances to secure this type of educational assistance.

John Madden, director general of technology and systems, research and development, department of communications, Canadian Government, added some interesting comments on educational uses of telecommunications from a Canadian perspective. In his opinion, educational uses have an important future, but most of the applications could occur in urban rather than rural settings.

"A commercial cable operator in Canada did a market survey recently and found that 50 percent of his suburban subscribers over age 24 want further education, and a big percentage of these are willing

to pay for it," he said. This new system, in a suburb of Montreal, offers a wide selection of free programs including selections from the Canadian film board. Operators see a very large market and sizable revenues if they can obtain the necessary rights to charge for these programs. "I see things moving so fast in this field that it will be very difficult not to leave rural areas behind," Madden said.

Questions about the magnitude of the demand for various services, at least in rural Maine, were raised by Ploch. "The assumption that people want these services has been made throughout this meeting," he stated. "I have data on three communities in Maine. The people have two recurrent dissatisfactions: (1) the attitude of teachers to their children, and (2) the poor condition of the roads. None of these communities have hospitals, doctors, lawyers, and so on, yet the people are not dissatisfied because they lack these things."

*Initial financing*

As for financing, Gronouski said, and the Panel concurred, that Federal assistance would be needed, not only in loans and grants for initial capital, but for initial operating costs. "Costs should not be charged against the users at first," he said. "We should wait for the system to achieve self-sufficiency. This is a traditional use of Federal aid." With regard to the achievement of self-sufficiency, however, he stated that some important services would never be self-sufficient, and should not for that reason be eliminated.

*Communications and the economics of development*

The panel stressed that the economics of development are complex. Much is unknown about the role communications may play. Among the observations made by the Panelists were:

- People have difficulty envisioning what it is that they might get or might want from broadband communications technology.
- Viability of communications systems from an economic standpoint will depend on adequate rural economic development, which, in turn, is what it is hoped that the systems will foster. At this point it is not at all clear whether substantial new communications systems can become economically viable. An understanding of the relationship of the economics of the system or systems to the growth pattern of the community will be necessary to avoid failure.
- There is increased public concern about who pays for new programs. In an era in which high economic growth rates are no longer automatically regarded as beneficient, and in which they in fact may not occur, there is increasing reluctance to mortgage the future. Demonstrations must therefore bear down hard on the question of who pays for what, and how. This emphasis by the Panel corresponds closely with the emphasis in the OTA Preliminary Report in stating that demonstrations should focus on economic viability.
- The fact that the private sector might not be interested in pursuing or developing certain uses of telecommunications in rural areas is not in itself a reliable index to the profitability of such uses. Because private capital is limited, those who manage it seek not all investment opportunities but only the most profitable.

Many applications of telecommunications in rural settings may produce a modest return on investment without maximizing investment, and may therefore be bypassed by private industry. Such applications might nevertheless be entirely feasible undertakings for rural cooperatives or local development corporation, paying off loans and realizing enough profit to carry and justify the operation, while providing important services that the private sector would probably pass by.

- Planning must take into account the fact that uses for a communications system will arise that cannot and will not be foreseen, and that such uses may change the economics of the systems. In this area one can perhaps reduce, but will be unable to eliminate, the unknown.

## CHAPTER 3

## TECHNOLOGY, ECONOMICS AND SERVICES

### PART I. BACKGROUND AND ISSUES

As has already been noted, the emphasis of OTA's Preliminary Report is on broadband communications, and its findings in the area of technologies, economics, and services reflect that emphasis. These findings served as the framework for the expanded discussion that took place in Panel II at the Conference. The following subsections—"Previous and Existing Applications of Broadband Communications," "Approaches to Demonstrations" and "The Trempealeau County System Plan"—summarize these findings.

#### PREVIOUS AND EXISTING APPLICATIONS

Applications of broadband communications to rural areas can be divided into two categories:

I. *Public services*

These include:

A. Health,
B. Education,
C. Law enforcement, and
D. Governmental and administrative services.

II. *Commercial services*

These include:

A. Security systems,
B. Information transmission,
C. Data transmission,[1] and
D. Pay TV.

For each application, the following were reviewed: (1) rural needs; (2) experiments conducted in providing the service; and (3) potential rural uses, including their feasibility and value. The analysis suggested the following major findings.

*Public service applications*

In both health and education, rural needs derive from shortages and inadequacies of facilities and personnel as well as from many factors that make access to services difficult, such as distances to be traveled. Financial resources, that is, lower incomes than in urban areas, the fact that fewer residents are insured for health care, and the generally smaller tax base available to support facilities also contribute to the reduced opportunity for health care and education in rural areas.

[1] At the OTA Conference, Panel II noted that data transmission did not belong exclusively in the commercial category. The Panel also recommended that a category be added to the public service list, called "Human and Social Services," with an indication that this includes vocational and social rehabilitation.



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In health services, a vigorous experimental program conducted over the last 12 years has demonstrated the feasibility of using broadband communications to meet rural needs. As summarized by Maxine Rockoff, communications technology has been applied to five basic areas of health care; consultation, supervision, direct patient care, administration and management, and education and training. Patient acceptance is high and it has been demonstrated that telemedicine can increase the adequacy of health care by providing access to services which were not available before or which were only minimally available. Health services personnel cite some problems, especially concern with privacy and confidentiality, but generally, their attitudes toward telemedicine are favorable. Unknowns requiring further research include the costs and benefits of video compared to nonvideo systems, and methods to combine manpower and technology into total health care delivery systems that can be self-sustaining financially.

Fewer experiments using two-way communications have been conducted in the field of education, especially in rural areas. Nonetheless, the technical feasibility of meeting many of the educational needs of rural areas has been demonstrated. There is, however, a lack of information concerning which kinds of hardware and software best support educational uses, especially concerning the relative effectiveness of education using broadband communications as compared to the traditional classroom.[2] Both educational programs adapted to broadband use and guidelines for the development of such programs are also needed. Generally, very little hard data are available on the cost-effectiveness of using broadband communications for education.

Rural needs in law enforcement derive from the long distances involved and the time consumed in travel to and from the central station, thus reducing the time available for assigned duties. Broadband communications could be used to televise rollcalls and briefing sessions, transmit fingerprints and related documents, and aid in the conduct of pretrial arraignments.

Hard data on the economic tradeoffs of using broadband communications to meet needs in law inforcement and governmental/administrative activities are not available for any setting, urban and rural. However, at least one experiment is underway in each of these applications which should provide some data on their feasibility and value.

*Commercial applications*

Potential security services include detection of fire and of unlawful entry, both of which are sources of major economic loss in rural areas. Broadband systems could be used to reduce these losses by permitting continuous monitoring of isolated buildings from a central location. Such systems are presently being installed in some new communities, but the economic viability of these in rural areas remains to be tested.

In the area of information, services are available which provide stock and commodities prices, round-the-clock news and other information. If the necessary market exists, these could be readily delivered by rural broadband systems.

[2] A distinction not made in the Preliminary Report, but important to keep in mind when considering communications technology and education is additive (supplemental) vs. substitutive applications: Communications may be used to supplement existing educational activity or to *substitute* for existing methods of providing educational service.

As for private business uses of broadband systems, the potential of high volume data transmission and of automatic meter reading were examined. A working system in New York City uses the excess channels of a local cable television system for transmitting massive amounts of information between a central bank office and many branches. The bank pays a fee to the cable company for its use of the system.

The potential for automatic meter reading arises from the fact that manual reading of meters for water, gas, and electricity is especially costly in rural areas because of the distances between houses. A recent study indicates that the cost of manual meter reading will exceed that of automatic meter reading via cable by the end of the decade.

The final commercial application reviewed was pay-TV, for which subscribers pay a fee to obtain special programs and sports events. Pay-TV has been introduced as a supplementary service on a number of cable systems, mostly larger systems in urban centers, and has thus far demonstrated viability in the market testing that it has received.

The economic viability of these commercial uses in rural areas has yet to be proved. However, they represent potential sources of revenue which could be used to support a rural broadband system.

APPROACHES TO DEMONSTRATIONS

A major purpose of many broadband communications experiments in public services has been to demonstrate technical capability. Economic feasibility and the design of economically viable systems have received less attention. Any consideration of cost effectiveness has been limited to the use of technology to provide a single service. Detailed consideration of a system approach to broadband communications in which costs are shared and revenues are generated by a combination of public users, commerical users and subscriber-supported entertainment fees has not been attempted. However, such a system approach may be the key to an economically viable broadband system which could serve an entire rural community.

*The system approach to communications*

To the extent that technologies can be combined for the delivery of various services, or a given technology can be adapted for diversified use, cost effectiveness can be increased, and communications systems might become economically viable in areas that might otherwise not be able to support them. Among studies directed to this problem is one conducted by the Department of HEW to determine what kinds of services might be "piggybacked," one on top of the other, at varying levels of system complexity and cost.

For this to work, as pointed out in the Preliminary Report, markets must be aggregated, systems must be able to deliver a number of different types of services to different customers, and the delivery system itself must have areawide coverage, with easy accessibility to all persons needing or wanting the service.

With specific regard to cable television, the pace of development of multipurpose usage has been disappointing when contrasted to the expectations of the sixties. A 1975 National Cable Television Association survey of 654 cable systems regarded by the association as most likely to be engaged in the origination of local or community pro-

graming found that the number of these systems actually doing such programing had dropped 22 percent during the past year. The survey also found that only 31 of this select list were leasing channels for non-entertainment use, and only 5 percent were experiencing sufficient educational use of their facilities to warrant the assignment of a channel exclusively for this purpose.

Other indicators, however, point in a different direction. When a number of cable operators approached city officials of Portland, Oreg., seeking a franchise for cable service whose economic base would be almost wholly restricted to the delivery of entertainment, the city undertook its own study to find out if it would be feasible to introduce a cable system into the city that was in fact a full communications network capable of meeting diversified needs of public service and commerce in addition to providing standard TV to the home. The city quickly found that certain public institutions such as schools and hospitals, and certain commercial establishments such as banks, were experiencing electronic communications problems for which a well-designed cable system appeared to offer cost-effective solutions. Several of these public and private institutions pledged themselves to the leasing of one or more channels on such a system, at rates that provided a strong base of economic feasibility for the system. However, the city has been unable thus far to find a commercial cable company willing to build the type of system envisioned in the city's study and plans so far remain unrealized.

### THE TREMPEALEAU COUNTY SYSTEM PLAN

In a rural setting, creation of a system based on the diversified system approach is underway in Trempealeau County, Wis., under the sponsorship of the Western Wisconsin Communications Cooperative, a consortium formed by 23 other cooperatives in the county. Trempealeau County is predominantly rural, with a population of 23,172 persons and a median income of $7,391. Thirteen percent of all families depend on public assistance and 14 percent have incomes below the poverty level. These factors and the county's low density of potential subscribers per square mile (10, as opposed to the 30 to 40 per square mile regarded by the cable industry as the necessary minimum to support a traditional-type cable system) have made the area unattractive for development by commercial cable operators.

The situation is notably similar to that which gave rise to the creation of rural electric cooperatives, and the passage of the Rural Electrification Act in 1934, to bring electric and telephone service to areas that were not attractive to private utilities. The solution being attempted in Trempealeau County follows the same path—the use of cooperatives. The emphasis on economic viability bears notable relationship to the experiences of the city officials of Portland, Oreg., who were exploring the problem in a much different setting.

A feasibility study conducted in Trempealeau County confirmed the opinion of the commercial cable industry; namely, that a system built in the county whose sole economic basis was the delivery of over-the-air TV signals had little chance of being self-supporting. Further exploration, however, revealed that the county's public school system

could make substantial use of a two-way cable hookup among its scattered schools, and was ready to pay for it. The school system wanted the cable link to make special teachers and experts located at one school system accessible to all pupils at all schools without requiring students to travel from school to school; to make education available to the handicapped, the elderly, and other persons wishing to pursue their education at home; and to conduct inservice teacher training throughout the system without requiring the teachers to travel.

With this public service customer standing by, the cooperative secured a community facilities loan from the Farmers Home Administration under the Rural Development Act of 1972—the first such loan, and, so far, the only one, to be granted under this act to build a communications system. The cooperative began letting bids for construction of the system in the summer of 1977.[3]

## Part II. Critique and Commentary

In the text that follows, information from Panel II has been combined with related material drawn from papers prepared in advance of the Conference and circulated to participants. This section is organized into five broad headings. These are: Types of services and their possible delivery by telecommunications; telecommunications, transportation and alternate forms of service delivery; telecommunications technology; people, services and institutions; and recommendations for demonstration projects.

### Types of services, and their possible delivery by telecommunications feasibility and economics

Responding to OTA's query as to which services on its list might feasibly be delivered by telecommunications, the Panel stated that experiments and demonstrations already undertaken have shown that technological capability is generally adequate. The real question is, "What is feasible in economic and institutional terms?"

The finding in the Preliminary Report that economic information is currently inadequate was supported by the Panel. For example, Peg Kay, Fellow, Office of Telecommunications Policy, told the Panel that experiments to date "have not yielded much believable economic data."

*The Lyall study*

To provide a point of departure in discussing economic feasibility of multipurpose rural systems, OTA contracted with Lyall Associates of Baltimore, Md., for a design and evaluation study of a rural demonstration telecommunications system for Poinsett County, Ark. The study used a cable model developed by Lyall Associates for urban cities and modified for rural applications. The report from this study,[4] avail-

[3] This case, of special importance to those interested in introducing new communications systems to rural areas, is discussed in detail in Chapter IV of OTA's Preliminary Report.

[4] "Design and Evaluation of a Demonstration Rural Telecommunications System for Poinsett County, Ark." submitted by Lyall Associates to the Office of Technology Assessment, Sept. 30, 1976. This paper is recommended for those interested in an analysis of the economics of a proposed cable system designed from its inception to accommodate substantial amounts of nonentertainment communications.

able to conferees prior to the Conference, included a detailed economic breakdown of the projected cost of constructing a two-way cable system connecting eight towns in Poinsett County.

The study concluded that only about half the costs of such a system could be met by home subscribers' fees for entertainment. The rest of the cost, amounting to $87,000 a year, would have to be met through fees paid for use of the system by public service and commercial users.

Potential public service uses projected by Lyall included:

(1) *Education.*—Sharing of specialists among the county's seven school districts; remedial and special education; adult and vocational education.

(2) *Health.*—A two-way telemedicine link between the county's largest hospital and a number of outlying clinics.

(3) *Consolidated social services.*—Two-way video links among a number of social service offices scattered throughout the county, to facilitate and consolidate eligibility and collection procedures for a number of social benefits programs for the unemployed, the aging, and the sick.

Subjecting these applications to a cost analysis, Lyall divided them into three groups:

(1) applications resulting in delivery of the current level of benefits at lower cost;

(2) applications resulting in an increased level of service at the same cost; and

(3) applications resulting in an increased level of service at increased cost.

The analysis showed that most of the public service applications fall into the third category. They involve, the study said, "the provision of more and higher quality levels of service at increased budgetary cost to State and local agencies."

These incremental costs, the study stated, "must be taken into consideration in assessing whether the net benefits of such uses can approximate the required annual contributions cited as necessary for the system to break even."

*Two types of public services*

An important distinction must be made between two categories of public services. One category is those services whose delivery has been mandated by law and for the delivery of which tax dollars have been allocated. There is no logical or a priori reason why these funds could not be used to deliver such services by telecommunications if the quality of service provided equals or excels that of a more conventional means of delivery and/or if communications is the only way to provide these services. (An example of the last is the failure to attract and retain a doctor. A paramedic with a communications link to a distant hospital may then be the only way to provide sophisticated medical care.)

The other group of services is those for which there is no legal mandate. Funding for delivery does not exist in public budgets and must be found if the service is to be provided. In the opinion of the Panelists, some services in this category, including, for example, certain health services, may be self-supporting, even when not mandated by law.

Katherine C. Lyall, director, Lyall Associates, and Herbert S. Dordick, associate director, Center for Communications Policy Research, Annenberg School of Communications, University of Southern California, discussed the problem of trying to use a partial-coverage telecommunications medium such as cable to deliver either services required by law, or services involving universal eligibility. Dordick stated that the issue pointed up the need for an integrated system of delivery, involving various modalities.

*Some questions and doubts*

Multiuse communications systems such as that being planned in Trempealeau County and that envisioned in the Lyall study were referred to frequently in the Panel discussion. Ownership of such systems by cooperatives was a major question discussed. In both Panel II and Panel III, representatives of cooperatives raised the question of whether current FCC prohibitions against common ownership of a colocated cable system and telephone company should be lifted. Removal of such restrictions would permit cooperatives to create combined telephone-cable communications complexes in rural areas.

Major doubts about the multiservice concept were expressed by Russell Karp, president of TelePrompter Corp., and Rex Bradley, president of Telecable Corp. Both are multisystem cable operators known for their interest in, and sponsorship of, innovative uses of cable.

Referring to the widespread flush of enthusiasm for cable's potential in the early seventies and the subsequent mood of disillusionment, Karp asked, "Are we going down the same path that we went down 5 years ago? What is really known?" He suggested the following answers. First, there is some sense that broadband can be used in rural areas, but maybe narrowband is better. Second, little is known about the economics of the entire picture.

From there, Karp said, we find ourselves taking an "infinity leap" to such concepts as common carrier phone-cable communications systems, "before we know what either the problems or needs are." With specific reference to ownership by cooperatives, Karp said, "We are discussing change in the economic approach before we know what the needs are."

Raising the question, "Who will pay?" Bradley stated that cable has become "a target of do-gooders, Government agencies, and everyone else," all of whom have suggestions about things that the cable companies can give away in the interest of promoting social and public welfare. "The telephone company doesn't give anything away," Bradley said.

"Where and how far are we going in our effort to achieve social equity?" he asked. Stating that each step down this path adds another increment of public cost, he urged consideration of how far public policy should go in the direction of underwriting large selections of amenities for persons living in substantial isolation.

Questions of this type were among those raised in OTA's Preliminary Report. The Preliminary Report recommended systems demonstrations as a way to secure answers to such questions so that there is an adequate basis for decisionmaking and legislation.

### TELECOMMUNICATIONS, TRANSPORTATION, AND ALTERNATE FORMS OF SERVICE DELIVERY

The Panel's discussion of possible alternate forms of service delivery centered principally on various aspects of the transportation-communications tradeoff as it operates, or might operate, in rural settings.

According to Ira Kaye, consultant, Washington, D.C., many rural families in effect have no transportation. Either they own no car or they own only one, and that one is gone during the day. Interstate highways have actually served to increase isolation, because local bus stops have been abandoned. Various agencies, such as the Post Office and local school systems, own vehicles but use them independently and only for tasks within each respective agency. A typical result is that a visit to the doctor's office can cost a rural dweller a third of his social security check. Properly planned uses of communications technology, he stated, can reduce or eliminate many problems of this kind.

What is needed, Dordick said, is some hard economic study data on investment in transportation versus investment in communications technology. Which has what impacts? A study that he recently performed, Dordick said, strongly suggested that investment in communications has a bigger local payoff.

Robert Mullins, legislative assistant, National Farmers Union, noted that, while communications networks can decentralize many services, no one is seriously suggesting that all services be delivered directly into the home. Therefore the realistic configuration is a combination of communications facilities that bring various services closer to the rural dweller, and some form of transportation link to cover the last few miles between the decentralized location and the user's doorstep. The creation of such links becomes even more important as the older segment of the U.S. population increases in size, creating a growing body of citizens who cannot drive or do not have a car and who do not have anyone to take them where they want or need to go.

The Panel recommended that, where possible, services be delivered to home terminals, including the telephone. When the service is to be delivered to a decentralized location other than the home, the problem of transportation should be dealt with as part of the plan if at all possible. Even without such a supplementary transportation plan, however, the Panel stated that decentralization of services through telecommunications represented incremental improvement.

### TELECOMMUNICATIONS TECHNOLOGY

The Panel strongly recommended that a "high technology push" should be avoided. Sophistication of technology should be the minimum necessary to achieve a given end, and testing of highly sophisticated technology should not be the driving force behind any demonstrations that may be mounted.

Speaking practically, the Panel said, technology is usually not the problem. The real problems are determining needs and dealing successfully with institutional barriers. These issues are discussed more fully in the section immediately following.

Regarding the specific choice of technologies for demonstration purposes, the Panel said that such choices were premature, and should be made after needs are ascertained. In short, needs should govern technology.

On the availability and reliability of various kinds of equipment, the Panel stated that cable TV when used in a one-way mode, satellites, microwave, and conventional broadcast TV equipment are all of proven reliability. Cable in a two-way mode continues to pose technical problems, and good data terminals are generally not available in off-the-shelf models.

The Panel urged that the problem of privacy should be studied and dealt with in any demonstrations using telecommunications technology.

*The narrowband question*

A number of persons on the Panel urged full exploration of narrowband technology, specifically the telephone network. Advantages of this network, the Panel said, are its in-place plant, its nearly universal coverage, and its relatively low usage cost. The views of many Panelists were summed up in a paper prepared by OTP, entitled "Review of Representative Public Experiments as They Apply to Rural Telecommunications." This paper, which was circulated prior to the Conference, stated:

> The telephone system, while the oldest technology discussed, offers perhaps more new practical uses than any other technology. This is because our perception of the telephone has been far too limited. A telephone system can do a great deal more than simply carry telephone conversations. The key to more versatile use of the phone system is a wider range of terminal equipment. With appropriate terminal equipment, the phone system can easily transmit all forms of digital data, printed materials (facsimile), still images (slowscan video), and many forms of remote instrument readings, for example, remote EKG's. The ability to transmit still images with slow-scan video equipment is particularly important because many of the applications for which closed circuit television have been proposed do not really need full motion.

The disadvantage of the telephone network, of course, is its limited bandwidth. This bandwidth is inadequate for transmission of moving electronic pictures and requires as many as 5 or 6 minutes for the transmission of a single picture or page of print by slow scan.

It is is of course vital to evaluate fully the potential of narrowband. Whether or not narrowband systems have sufficient capacity depends on the uses to which a multiservice system is to be put.

*Systems considerations*

Panel II echoed the warning of Panel I, noting that uses for telecommunications systems may arise that have not been foreseen and that may affect both the balance of usage and the economics of such systems. It recommended that a common carrier approach be tested, arguing that such a system would be flexible and permit the addition of locally generated uses not originally envisioned by the project planners.

Speaking from the viewpoint of rural electric and telephone cooperatives, C. Ray Ballard, Assistant Administrator, Telephone, Rural Electrification Administration, suggested that the best solution to the economic problems might be a common carrier network combining telephone, point-to-point, and cable TV service. Such a common facility, he said, might be able to handle economic problems that none of

the systems, established separately, could solve.[5] Karp's view that the creation of such systems at this time far exceeds demonstrated need, has already been noted.

Responding to a specific request from OTA for guidance from the Panel on the relationship of plans for demonstrations to swiftly changing communications technology, the Panel provided the following information and recommendations:

(1) Many technologies are available, and they are rapidly changing.

(2) The economics of the various technologies is also rapidly changing.

(3) It is not possible to decide today on the status of technologies and costs 5 years from now.

(4) The start of demonstrations should not wait for the arrival of new technologies or the full development of technologies now in the experimental stage.

(5) Off-the-shelf technology should be used whenever possible.

(6) Simplicity of operation should be sought, but does not necessarily mean low cost. It may actually mean higher cost. This is particularly true of terminals. Substantial expenditure may be required in a given project to obtain hardware that fits the specific needs of the experiment.

(7) The cost of privacy can be high. This is both an important and a potentially costly issue.

(8) Meeting needs should be emphasized over technology in creating experiments and demonstrations. Technology should serve needs.

### PEOPLE, SERVICES, AND INSTITUTIONS

*Local involvement*

The Panel emphasized the necessity of local involvement in all phases of any demonstration, including asking local persons whether they want the demonstration in the first place, finding out from them what they want and need, including them deeply in the operating plan, and assuring that their role is such that the project can operate on its own momentum when outside help is withdrawn. This view was echoed in a paper provided by the Office of Telecommunications Policy. "Localities are able to perceive their own sustantive needs," OTP stated, "and, indeed, there is every indication that innovations inspired by needs designated as such by 'outsiders' are rarely adopted by the community in question."[6]

In a paper circulated to participants, Marshall said, "It is particularly important to restore the sense of community by local rural groups who feel that large-scale governmental and private organizations make local participation more difficult." Kytle agreed. Widespread provision of nonentertainment services could have a significant impact on rural growth and public services, he said, only if "local residents perceive these services as important to their felt needs and as instrumental in

[5] As has already been indicated, such a combined communications facility would require changes in FCC's current regulations prohibiting common ownership of colocated telephone and cable systems. Richard Wiley, FCC Chairman, states that FCC's current policy in this area is under review.

[6] "Communications in Rural Areas," OTP, October 1976, p. 6. This conference paper is not the same one as that cited at the beginning of this chapter.

the fulfillment of their community goals—and 'if' that presumes the existence of locally oriented plans for rural development."

Amplifying on these themes and speaking from the vantage point of Alternate Media Center's well-known success in helping build local involvement in programing on the Reading, Pa., cable system, Red Burns, executive director, Alternate Media Center, said:

(1) Unless the user sees the value of the proposed activity or application, all efforts to promote it will be hopeless.

(2) It is essential to build on existing programs, organizational activities, and resources.

(3) This building process must be achieved slowly.

(4) A local board should be developed to plan, guide, and oversee the proposed activities.

(5) To a far greater extent than is often envisioned in plans for demonstration projects, the real cost in both time and money is in this spadework, and not in the software.

The Panel recommended that the project itself, and its outside personnel, should be low profile. It issued a particular warning against building or creating new institutions in a local community, which tend to pass away when the project financing ends, leaving the basic structure of things unaffected. Old and existing institutions, the Panel said, should be adapted to new use.

While the Panelists strongly stressed the need for local determination of local needs, O'Neill stated that people and communities do not always think of all possible needs and ways of meeting them. Thus, complete abstention from providing any outside help should not be an inviolate rule.

State and local commitment, the Panel said, are both essential. One important measure of commitment is, are State and local authorities already spending money on the particular need?

Kytle recommended "a marketing strategy to promote citizen involvement in the planning process." This strategy, he said, should—

- Build awareness within the community of the potential of broadband communications technology, presenting an array of potential services in such a way as to facilitate community choices; and
- Relate the plan for broadband communications to the stated objectives of a community development plan.

He also suggested an organizational structure involving both public and private entities. "The varied mix of services, programs, clients, and technology projected in the OTA concept," he said, "may in actuality argue for a brand new kind of organization—one in which a desirable balance between public and private incentive is established and maintained through a quasi-public federation to which many different kinds of organizations belong."

*Aggregation of services*

The Panel recommended that demonstrations should involve a mix of services; and, further, that some prior decision should be made on who will be the aggregator, and what support this person or entity will need, both in engineering matters and in coordination with Federal and other agencies and institutions. This latter consideration involves the problems of institutional structure, soon to be discussed.

While agreeing with OTA's Preliminary Report on the necessity of aggregation, the Panel also stressed the difficulty of its achievement. In a Rand survey of 70 projects which sought to aggregate or integrate local services, William Lucas, senior social scientist, Rand Corp., said, "Most were superficial and very few achieved any economies." The Panel clearly regarded the problem of achieving viable aggregation of genuinely useful services and functions to be one of the biggest challenges facing proposed demonstrations.

*The institutional problem*

A recurring theme of the Panel's discussions was the difficulty of coordinating and directing the efforts of the numerous autonomous Government agencies that would necessarily be involved in the type of demonstrations proposed in the Preliminary Report. "The toughest job in the world," Ira Kaye said, "is to get Federal, State, and local agencies to work together." The problem is complicated, he said, by the fact that, to date, most communities have not genuinely benefited from experiments and demonstrations. In fact, some have probably suffered net harm from the creation of new activities on which some people come to depend, and which collapse when demonstration money dries up.

The institutional problem was also raised in Panel III, where it received detailed attention. The discussions in both Panels led to the recommendation that emerged from the final session of the Conference, regarding coordination of demonstrations at the highest executive level of the Federal Government, with detailed and continuing oversight by Congress.

## RECOMMENDATIONS FOR DEMONSTRATION PROJECTS

OTA asked Panel II to comment on whether the system demonstrations recommended in the Preliminary Report would be useful in clarifying questions of economic feasibility, technical capability, and appropriate services for delivery. The Panel's views, expressed through many of its statements and recommendations already set forth, were that useful purposes would be served by system demonstrations designed to address economic issues, structured to respond to locally generated conceptions of needs, and conducted with a solid base of local participation and involvement at every stage. The Panel was not concerned about proving out technological capability, which it regarded as generally adequate for any contemplated service delivery.

The Panel provided a checklist of recommendations for conducting demonstrations. Although certain of the points have already been touched upon in the immediately preceding pages, the checklist is given here in full.

(1) Demonstrations should run for a "reasonable" length of time, perhaps 5 years. Many Panelists noted that the usual length of time allotted for federally supported experiments and demonstrations in communications—1 or 2 years—was insufficient to lay proper groundwork, to allow the activities to establish themselves fully in the ongoing pattern of community life, and to provide for proper evaluation. The Panel placed particular stress on its recommendation of a longer time span to produce worthwhile results.

(2) Demonstrations should be so planned as to be in phase with budget cycles of the key agency or agencies. Important problems, and in some cases insuperable obstacles, can arise if an agency's budget either makes no provision for participation in such demonstrations or if funds that might have been allotted have been partially or completely spent.

(3) Careful design and evaluation are essential.

(4) There should be cost-sharing, with both Federal and non-Federal money involved. This is the economic corollary of the Panel's view that demonstrations cannot and should not be run "from the top down."

(5) A catalyst is needed to assist local people without taking the project away from them or reducing their involvement to the level that will jeopardize the project after the initial phase. The basic thrust must be in terms of identifying needs and assigning responsibility for management. This recommendation combines the Panel's strong emphasis on local involvement and initiative, with comments such as those of Jack O'Neill, associate department head, Telecommunications Systems, Mitre Corp., and Kytle on the role of the demonstration sponsor.

(6) The question of replicability should be considered in planning and carrying out the project.

(7) The technology should be selected after the services have been decided upon, and planners should mix technologies in a combined way when necessary.

(8) Care should be taken to avoid being "drowned" in hardware.

(9) The objective of the demonstrations should be to reduce levels of uncertainty on costs, demand, and institutions.

(10) Most successful demonstrations have been those in which the technology was "well in hand," so that the project can concentrate principally on what people want.

(11) The best diffusion comes from "market pull" rather than "technology push."

(12) Failures should be publicized. The syndrome of thinking that a given project or demonstration "must succeed" should be avoided. The Panel emphasized that more valuable lessons are often learned from failure than from success, and urged a sharp break from the natural but potentially harmful idea that expenditures must be justified by showing that a given plan or activity "worked."

(13) The emphasis should be on rural services, not rural telecommunications. For this reason nontelecommunications options should be considered, explored, and tested, along with telecommunications options.

(14) The county may not always be the correct unit for mounting demonstrations. Intercounty and regional approaches should be studied.

(15) Many services should be explored, and many demonstrations should be contemplated.

(16) Strong attention should be paid to demonstrated need.

(17) The user must see, understand, and accept the usefulness of the service delivery system, and project managers should concentrate on building such awareness.

# CHAPTER 4

# FEDERAL POLICY

## PART I. BACKGROUND AND ISSUES

The Federal Government plays a role in the growth, development, and operation of electronic communications technologies that is far greater than its role in relation to print technologies. Although Federal policy does affect these latter technologies in certain ways such as the establishment of preferential postal rates, the first amendment exempts print media from Federal regulation or control for many of their major activities.

In the telecommunications field, however, common carriers (in which the companies supply the physical facilities and the customer supplies the content) such as the telephone and telegraph networks, and communications satellites offering channel space for lease, have the status of regulated monopolies.

Radio and TV broadcasting are regulated on the basis of their use of the over-the-air spectrum and do not function as common carriers. The over-the-air spectrum is considered a publicly owned resource that the Government makes available to private users by license.

Cable TV is federally regulated by virtue of cable's activity in rebroadcasting over-the-air radio and TV signals. A 1968 Supreme Court decision held that the Federal Communications Commission had jurisdiction over cable "reasonably ancillary" to its powers to regulate broadcasting. This is at best a vague charter, and, as will soon be noted, the Commission and some Members of Congress are aware that a more specific legislative mandate might be desirable.

### CURRENT FEDERAL ROLE IN FOSTERING TELECOMMUNICATIONS DEVELOPMENT SPONSORSHIP OF RESEARCH, STUDIES, AND DEMONSTRATIONS

Funds from private industry, foundations, and the academic community are not sufficient to test the full array of possible commercial and public uses of new communication technologies. By providing additional funds to test new concepts, Federal support can affect the speed and direction of development.

In recent years a number of Federal agencies have conducted or funded telecommunications research, studies, and experiments. These include: the Office of Telecommunications Policy; the Office of Telecommunications of the Department of Commerce; HEW, particularly the Office of Social Rehabilitations Service; the U.S. Office of Education and the National Institute of Education; the National Science Foundation; the Postal Service; the National Aeronautics and Space Administration; and OTA. Recent initiatives include:

- Funding of three studies by the National Science Foundation, in which nonprofit research groups are working with municipal governments to test public service uses of two-way cable links. The projects funded by NSF are briefly described below:
  - —In Spartanburg, S.C., the Rand Corp. is testing the use of two-way cable to deliver basic adult education, to train persons providing day care to children, and to improve communications between and among municipal and State offices.
  - —In Rockford, Ill., Michigan State University is supervising a project to provide firefighting training to members of the city's fire department.
  - —In Reading, Pa., New York University's Alternate Media Center is working with the city government and senior citizens groups to provide a number of informational and community services to the elderly by two-way cable.
- Funding by HEW of a study being conducted by the Cable Television Information Center, a nonprofit group established by the Ford Foundation, to test the value of using cable for delivering social services to the severely handicapped.
- A series of experiments funded by NASA, HEW, and the Corporation for Public Broadcasting (CPB), employing satellite communications to deliver career information to students in high schools in sparsely settled areas of the Rocky Mountain region, teacher training programs to Appalachia, and educational and medical services and intercommunity communications to villages in Alaska.

On the legislative side, the Educational Broadcasting Facilities and Telecommunications Demonstration Act of 1976, which became law in June, provides a 1-year authorization of $1.25 million for telecommunications demonstrations in health, education, and social services. Another bill, the Telecommunications Demonstration Act of 1975, was designed to create a Bureau of Telecommunications within the Department of Commerce to conduct research and demonstrations. This bill was introduced into the last Congress but was not acted upon.

*Federal loans, and loan guarantees*

Several Federal programs provide or have provided loans or loan guarantees for the construction of new communications facilities. As has been noted, loans for the construction of the cable system in Trempealeau County were obtained by a cooperative through the Rural Development Act of 1972. OTA was informed in a letter from the Administrator of the Farmers Home Administration in December 1975, however, that this type of loan will no longer be made.

Legislation creating the "new towns" program made it possible for these planned communities to include cable systems among the infrastructure of public services for which Federal guarantees of loan money could be secured. However, this program is no longer operational.

It has been urged by a number of persons and groups that the introduction of new communications technologies and systems to rural areas should be expedited by a substantial Federal program of low-cost, long-term loans, paralleling the Rural Electrification Act of 1934 which facilitated the introduction of electricity and telephone services

to rural areas. A recent report on rural communications by the Booker T. Washington Foundation/Cablecommunications Resource Center recommends this approach, and a number of bills embodying it have been introduced into Congress during the past several years, but none has been acted upon.

*Federal regulation of interstate communications*

This activity is carried on by the Federal Communications Commission, operating under the Communications Act of 1934. In recent years FCC has been deeply involved in regulatory activity on several fronts that have an important bearing on the introduction of new and improved communications systems into rural areas. Some of these activities are briefly summarized below.

*Cable television.*—The Commission's basic regulations governing cable TV are embodied in a lengthy report and order adopted in 1972, and in a number of supplementary or modifying orders adopted since that time. Substantial discussion and controversy in this field have centered on two areas.

The first is the effort embodied in numerous complex provisions of the regulations, to prevent cable from causing serious economic harm to the existing over-the-air broadcasting system. The approach adopted by the Commission has been to limit the number of distant signals that cable systems can carry, thereby reducing competition to local broadcasters.

The second area is the fostering of public service uses of cable. In its 1972 order FCC required cable systems in major markets to provide one free channel each for governmental, educational, and public access use and to have channels available for leasing on request. In a 1976 order modifying this requirement, FCC ruled that its requirements for such public service channels will apply only to systems having 3,500 or more subscribers, regardless of where they are located, and that such systems need provide only a single channel for all public uses unless demand for additional capacity develops.

FCC and Congress have both recognized that the Commission has had to make numerous decisions affecting the advent of this new technology under the Commission's existing general powers to regulate interstate broadcast communications and without additional specific guidance from Congress. In 1976 the House Communications Subcommittee issued a staff study and conducted extensive hearings to determine what legislation, if any, might be needed to guide FCC and to set public policy generally.

*Satellites.*—FCC has had to make decisions as to which applicants should be licensed to operate satellites, what minimum capacity and capability satellites must have, and what should be done to relate satellite communications to existing communications systems. As the technology continues to improve, and the cost of rooftop antennas capable of direct satellite-to-home reception declines to the point at which many people can afford them, the Nation faces an important decision on whether our communications system should include this kind of direct link. Another important issue is the relationship various large communications entities, such as A.T. & T., IBM, and the Corporation for Public Broadcasting, to the emerging satellite network.

*The telephone network.*—The vitality of this network is an essential feature of U.S. communications, and FCC is virtually always in the process of making important decisions relating to it. In one recent decision, known as the *Carterfone* case, FCC permitted the development of competition in the making and sale of terminal equipment to be attached to the telephone network. Prior to this decision, the telephone companies had prohibited the use of such "foreign attachments," and potential users of various services were required to buy equipment made or approved by Bell. Now numerous other companies are competing with Bell for the sale of telephones and other types of terminal devices.

In another decision, the *MCI* case, FCC authorized a small private firm to offer certain data transmission and other commercial transmission services between certain major cities, in direct competition to Bell. A number of other firms have now entered the field of specialized data transmission as competitors to the telephone network.

The telephone companies have maintained that this trend in FCC decisions, and particularly the forms of competition arising under the *MCI* case, constitute an endorsement by the Commission of "cream-skimming" by companies that can operate only in areas of high profitability and do not have Bell's obligations of universal service. The result, Bell maintains, is a higher rate level for all users of telephone service. A bill to reverse FCC's decisions in these two areas was recently introduced in the 94th Congress, but was not acted upon.

This broad array of Federal activities affects all citizens, whether they live in urban or rural areas. Some affect the two groups of citizens differently, and some have much more impact in one area than in another. Panelists at the OTA Conference were asked to identify regulatory and legislative areas that they regard as being of particular importance for the development of rural communications, and, where they believe that changes might be of value, to give their ideas of what might be done.

With regard to Federal sponsorship of demonstrations, the Preliminary Report contained a number of comments related to Federal policy. These are indicated below.

### A SUGGESTED DEMONSTRATION PROGRAM

The Preliminary Report expressed doubt about the mounting of a large scale Federal program such as the Rural Electrification Act of 1934 to bring new communications systems to rural areas at this time and in the present state of existing knowledge of needs, uses, and applications.

The Preliminary Report stated that the suggested parallel between the spread of electrical and telephone service, and the spread of new technologies such as cable, may not be as exact as it appears. "For cable," the Report said, "content is all important, whereas the consumer supplies the uses for electricity or the content carried by telephones. Whether enough is presently known about program content to insure success of rural broadband systems is unclear." Therefore, before a large-scale Federal program is undertaken, a demonstration project should be considered, to provide the necessary information.

The OTA Report noted that the Educational Broadcasting Facilities and Telecommunications Demonstration Act of 1976 (still a bill when the OTA Report was released in April, and subsequently enacted in June 1976) is not directed toward rural areas, and that most of the studies and demonstrations that would be funded under the act would probably take place in urban centers. The allotted funds are not intended for the purchase of hardware and many of the funded activities would thus have to take place where relatively sophisticated broadband systems are already in place. Rural areas are therefore almost automatically excluded as demonstration sites under this act as it presently stands.

*Mounting the demonstrations*

If a decision to launch a demonstration program were made, several other decisions would be required:

- Designation of an agency or agencies to administer the program, collect data, and evaluate results;
- Provision of funding mechanisms; and
- Identification of potential demonstration sites.

For overall supervision, the Preliminary Report suggested consideration of an interagency task force or policy board composed of representatives from executive agencies and rural and industry groups. This unit could supervise the demonstrations in accordance with broad legislative guidelines. For line responsibility, major roles in the demonstrations might be assumed by the National Science Foundation, the Department of Commerce, and/or the Department of Agriculture.

An effective planning structure at the local level would be needed. Cooperatives of multicounty planning districts would be among the possible local participants.

Capital costs might be covered by loans secured under the Rural Development Act of 1972. However, as has been pointed out, loans for telecommunications systems are not expected to become a significant part of the community facilities program of the act. Congressional action will therefore be required if further assistance to broadband systems through this program is to be possible. Funds for the actual demonstrations could be provided through the lead agency or through outright grants or loans.

An essential criterion in the selection of candidate sites would be a high degree of community interest in, involvement in, and support of the project. This commitment could take the form of allocation of tax moneys to pay for educational and/or other public services in the demonstration.

The Preliminary Report suggested consideration of a limited demonstration program specifically for rural areas to investigate the feasibility and value of providing combinations of public services, commercial services, and entertainment services by telecommunications. The cost-effectiveness of various combinations could be tested in their application to communities having different kinds of demographic, socioeconomic, and institutional characteristics. "System demonstrations can provide data on what works, where, and under what conditions," the Preliminary Report said.

An estimate of potential costs to support four system demonstrations for a 5-year period was included in the Preliminary Report. On

the assumption that loans would be made available for hardware and for the extension or upgrading of systems, and that other costs would be covered by grants, the total cost of such a program was estimated at about $1.8 million per year.

If demonstrations prove the feasibility and desirability of bringing improved communications systems to rural areas, then the question of broader funding could be taken up, with consideration being given to a Federal program modeled on the Rural Electrification Administration. In the case of communications systems, a more flexible approach might be desirable, with different approaches being taken in the three broad categories of rural areas described earlier in this paper. The Preliminary Report suggested the following possible breakdown:

| *County Type* | *Federal Financing Mechanism* | *System Owner/Operator* |
|---|---|---|
| Turnaround Acceleration | Guaranteed Loan | Private Industry |
| Turnaround Reversal | Direct Loan | Rural Cooperative |
| Declining | Government Subsidy | Private Industry/Local Government |

## Part II. Critique and Commentary

The papers prepared for Panel III by Forrest Chisman of the Program on Communications, Aspen Institute, and Henry Geller, of the Program on Communications, Aspen Institute, and the discussion in the Panel itself were largely concerned with three subject areas:

- National policy and rural telecommunications;
- The impact of Federal legislation and regulation on rural communications; and
- Coordination of demonstrations.

### NATIONAL POLICY

There was strong agreement among the Panelists that national objectives in the field of telecommunications policy are ill defined. Charles Tate, vice president, Cablecommunications Resources Center, Booker T. Washington Foundation, called for national policy that encompasses both rural and urban needs. Collette Moser, director, Rural Manpower Research Corp., however, expressed reservations about this approach. "If rural and urban matters are treated in the aggregate," she said, "the resulting design will be more suitable for urban than for rural areas. We have already seen this in the development of social programs that are inadequate for rural needs."

The disarray of current policy was characterized by Geller in his paper. "As one scans the array of different regulatory policies," Geller said, "the most notable shortcoming from the standpoint of the development of rural communications is the absence of any concentrated policy perspective on the communications needs of rural America. The FCC, beset with innumerable competing demands for its attention, has dealt with problems of rural communications episodically and somewhat indifferently. This is understandable, given the political environment in which it operates and which generally gives but passing notice to distinctive rural needs. In broadcasting, in cable, in telecommunications, the concern of the Congress and the executive, as well as that of the industries and the interested public, has invariably been directed to

urban needs and interests. To discern any sustained interest in rural communications among these sectors of policy influence, one must look long and hard."

Geller added that describing the problem was far easier than curing it. Others, however, noted that much development in the delivery of services to rural areas through telecommunications could be made even with little progress on the problem of a Federal policy on rural communications. "Policies about telecommunications are less crucial than policies about services themselves," said Charles Brownstein, program manager, Division of Advanced Productivity Research and Technology, National Science Foundation. "When these are dealt with, then the delivery question can be addressed."

One area in which the Panel recommended a greater Federal role is in the advancement of technology; presently, privately financed research covers some technologies more completely than others and may be inadequate in the aggregate. The Panel also stated that, if a public infrastructure for some types of communications use is not provided, entertainment will be, for all practical purposes, the only product that will be delivered.

### LEGISLATION AND REGULATION

While relatively few Federal regulatory policies on communications were identified as major barriers, Panelists did cite problems in several specific fields, as indicated below.

*Cable*

FCC policy has retarded the development of cable nationwide, Geller stated, and this had redounded unfavorably on both urban and rural areas.

Geller also said that the policy of localism that is a keystone of our regulatory approach may not always be beneficial. Crossownership of cable and other communications interests, and cable/satellite development, both of which may not promote localism, should nevertheless be explored.

OTA's Preliminary Report took special note of the current FCC policy of requiring owners of larger cable systems (those with more than 3,500 subscribers) to provide free channels for education, government, and public access. As stated in the Preliminary Report, the opposite policy of requiring potential users to pay for channel space might produce sufficient revenue to help cable become economically viable in rural settings. With this consideration in mind, the Preliminary Report suggested that the concept of free channels might be subjected to review. The Panel agreed that the issue was a legitimate one and that the FCC policy had some impact on revenues, but accepted without dissent Geller's view that the exact impact, and the significance of the revenues involved, were not clear.

*Satellite*

For rural areas that do not receive public broadcasting from other sources, the Panel said that direct broadcast transmission by satellite to the home should be explored and compared to other technologies. Present Earth stations do not cover the 20 percent of the population that is farthest removed from urban centers. It was estimated that to

remedy this deficiency, the costs would be substantial. "It would have to be a national objective backed by dollars," Chisman said.

*Broadcasting*

Vincent Sardella, Director of Research, Office of Telecommunications Policy, stated that broadcasters generally have opposed proposals to use existing blank intervals of television signals to provide such public service applications as captioning for the deaf. A licensee, he said, tends to consider his portion of the spectrum, once assigned to him, as being "all his" and not subject to use for services in which he has not been involved. Sardella, however, also noted there may be some unique services for rural areas that might not encounter such opposition on the part of broadcasters.

Paul I. Bortz, division head, Industrial Economics Division, Denver Research Institute, suggested that low-powered TV broadcasts in rural areas should be considered.

The Panel noted that certain services that might be transmitted over the air, such as nursing training, educational courses, et cetera, do not serve a large enough audience to cover their costs. Harold E. Morse, director, Appalachian education satellite project, Appalachian Regional Commission, suggested aggregation of such services by satellite.

REA representatives stated that their agency is excluded from delivery of conventional TV services by present law. "We can do trunking only for specific purposes, and can't build for all potential uses," one REA spokesman said.

Panel Chairman Glen Robinson, of the Program on Communications and Society, Aspen Institute, noted that a simple amendment might permit rural telephone companies to provide entertainment. Another attendee said that cooperatives have been successful in identifying rural needs, and that they therefore could and should be permitted to become involved in cable.

COORDINATION OF DEMONSTRATIONS

The OTA Preliminary Report cited the National Science Foundation, the Department of Commerce, and the Department of Agriculture as Federal agencies that might assume "major roles" in a program of demonstrations. Taking a closer look at the question of who might actually provide leadership in coordinating the demonstrations, Chisman in his paper and the Panel in its discussions could not reach a recommendation.

The Panel noted, first, that Congress could not assume the task, since it is not a suitable agency for administrative direction or detailed planning. Discussion of other agencies paralleled the information set forth in Chisman's paper, and produced the same negative results. Chisman had considered each of the possible agency candidates, and had specified the shortcomings of each as a possible leader and coordinator of demonstrations. The outcome of the deliberations on a suitable agency is summarized below.

*Department of Agriculture*

Under the Department, the Rural Electrification Administration has been making low-interest loans to rural telephone companies since

1949 and is actively interested in broadband communications. It is, however, primarily a hardware funding organization, lacking the expertise in the other types of program activity associated with a service-oriented demonstration program (such as institutional problems, local involvement in planning and system design, program evaluation, et cetera).

The Farmers Home Administration, another Agency within the Department, is also primarily a hardware funding organization and is not appropriately staffed for a program involving the development of services via telecommunications. A third Agency, the Rural Development Service, has only a small staff that is already heavily occupied with other activity and that possesses no particular expertise to create a headquarters for a communications project.

*Appalachian Regional Commission*

ARC has been involved in recent satellite experiments and is interested in cominunications. However, ARC suffers from lack of funds and manpower to coordinate demonstrations.

*Office of Telecommunications Policy*

OTP officials state that they lack the manpower for a major coordination effort. The Agency is also uncertain of its future function structure and location in the executive branch.

*Department of Commerce*

The Department's Office of Telecommunications is primarily a research group. The Economic Development Administration and the Small Business Administration do not have communications as major areas of interest. In addition, EDA and SBA do not award grants to cable systems providing local origination, for fear of being accused of censorship of that origination if they should find it necessary to withdraw support for economic reasons.

*HEW*

The National Institute of Education, the Office of Education's educational facilities program, the Lister Hill Center for Biomedical Communications, and the Health Resources Administration have all been involved in telecommunications, but within the restricted areas of their mandate and, in most cases, with a small staff. HEW's own Office of Telecommunications is small in size and does not enjoy a high level position in that organization.

*Other organizations*

Organizations such as the National Science Foundation, HUD, and the Post Office Department are among other Agencies that have an interest in telecommunications, Chisman stated, but could hardly be more than partners in a series of demonstration projects.

Reviewing this diverse assortment, the Panel recommended that the executive branch of the Government should be "nudged" to create a suitable agency with a mandate and adequate power to oversee a demonstration program. This recommendation, in modified and more specific form, stood high on the list of proposals that emerged from the final session of the Conference.

## CHAPTER 5

## POLICY ALTERNATIVES AND CONFERENCE RECOMMENDATIONS

### Policy Alternatives

OTA's Preliminary Report suggested three major alternatives for Federal policy:

- Continue the status quo;
- Fund a limited number of system demonstrations projects; and
- Create a Federal mechanism to facilitate wide dissemination of broadband services in rural areas.

The Preliminary Report set forth pros and cons for each of these policy alternatives. These are summarized below.

#### CONTINUE THE STATUS QUO

The term "status quo" does not imply that Federal programs presently have no impact on the development of rural telecommunications. However, Federal involvement in broadband communications has been principally confined to research into potential uses. "Status quo" as a policy alternative thus indicates continued Federal support for this type of research, with little or no emphasis on programs primarily designed to assist in the actual deployment of telecommunications systems in rural areas.

*Pro.*—If increased use of telecommunications through our society represents "the wave of the future," then these technologies will eventually reach rural areas with little or no Federal intervention. Federal research programs designed to evaluate technology and single service uses may represent an adequate commitment of public funds under this assumption. The National Science Foundation Phase II experiments, for example, may demonstrate the utility of communications for meeting some nonentertainment needs and may stimulate interest among system operators in the revenue generating potential of public service applications.

Continuation of the "status quo" might also prevent large scale commitment of funds for widespread rural applications of broadband communications before their value has been established.

*Con.*—Although market forces alone may ultimately bring about a somewhat greater coverage of rural areas by broadband communications systems than is presently the case, there seems little doubt that such coverage will continue to be highly uneven, and that a full range of public services might not be provided in the absence of more direct Federal stimulus and intervention. Systems may bypass those rural areas that could benefit most from the services that could be delivered.



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Even in those areas in which market forces may cause systems to be built a number of years from now, lack of Federal stimulus will unnecessarily prolong lack of access to benefits.

There seems little question that Federal assistance will be needed for widespread deployment. The difficulties of financing, and the many tasks to be done, such as surveying community needs, designing revenue producing applications, and securing community and local government support, present practical barriers that potential system operators are likely to find insurmountable.

In addition, if rural needs continue to receive low priority under present or revised national telecommunications policy, a number of options for system development in nonmetro areas could be foreclosed. For example, if it were assumed that cable systems are not economically viable in low density areas, the decision might be made to improve conventional network coverage in these areas with translator service, thereby eliminating a major potential source of revenue (that is, entertainment TV) for cable systems, and consigning these areas to lower levels of telecommunications service delivery. Similarly, with the advent of fiber optics, a decision might be made to use fiber optics exclusively in a national communications network, rather than in individual rural based systems as well.

### FUND A LIMITED NUMBER OF SYSTEM DEMONSTRATION PROJECTS

*Pro.*—Current data are inadequate to evaluate both the usefulness and the economic viability of multiservice broadband communications systems in rural areas. For example, making channels available for public service and institutional use on a broadband system provides no guarantee that effective use will be made of them, or that anyone will pay to use them. A system demonstration program will provide hard data on uses and economics. Such data are essential to the formulation of responsible Federal policy, and for the commitment of resources by either governmental entities or private entrepreneurs to system construction.

There are indications that some applications of broadband communications could be attractive to potential operators. However, the components of an effective systems package are not known. Demonstration of the economic viability of certain uses and combinations could encourage the construction of broadband systems in rural areas that would be designed from scratch to accommodate such uses. Similarly, if demonstrations showed that such systems could fill important needs and deliver important services in rural settings, this could greatly influence Federal decisionmaking on such questions as the provision of low-cost, long-term financing for system construction in rural areas.

*Con.*—It has been argued that demonstrations can be omitted, and direct moves made toward putting together "packages" such as that created for the Trempealeau County system. Those who favor this view often state that both rural needs and telecommunications have already been adequately analyzed and studied and that real life plans can be made now. For persons with this point of view, the 5-year span envisaged for demonstrations—to which must be added an additional

period of time before they can be organized and started—represents an unnecessary loss of time that could be used for widespread deployment of multiservice communications systems.

### CREATE A FEDERAL MECHANISM TO FACILITATE WIDE DISSEMINATION OF BROADBAND SERVICES IN RURAL AREAS

The legislative approach most often suggested consists of low-cost, long-term loans paralleling those made available under the Rural Electrification Act of 1934. It is argued that the hesitancy of private industry to create broadband communications facilities in rural areas today parallels the hesitancy of private industry to provide telephones and electric service to these areas 40 years ago. Thus, the mechanism which was effective then, largely because of the rural cooperatives, should be effective now.

*Pro.*—If the parallel between broadband services and electricity and telephone service suggested above is valid, further delay is unnecessary. In addition, the Federal program envisaged is not a costly one. The Rural Electrification Act of 1934 involves Government expense consisting of debt service on the loans plus the cost of administering the program.

*Con.*—The suggested parallel may not be valid. Because the potential applications of broadband communications systems in rural areas have not been tested either for acceptance or for economic viability, the simple act of helping an operator to secure funding may not be enough to insure a fair chance of success. Use of broadband systems for other than the traditional delivery of entertainment programing may or may not occur if this approach is employed. If multiple uses are not established, fees to subscribers for entertainment television are likely to be high, resulting in limited service to a limited number of viewers; and substantially defeating the public service applications that constitute a major rational for Federal involvement.

### Conference Recommendations

Two additional policy alternatives were outlined prior to the Conference, bringing the total number of alternatives put forth for consideration by the Conference to five. The two additional policy alternatives fell between the two extremes of "continue the status quo" and "create a Federal mechanism to facilitate wide dissemination of broadband services in rural areas." Thus, in addition to considering the policy option of system demonstration, conferees were also asked to consider the following alternatives:

- Congress should waive some or all Federal regulations which now inhibit growth of cable television in rural areas to learn what kinds of systems will develop "on their own"; and
- Congress should adopt a policy goal of facilitating development of telecommunications in rural areas, and then explore further what kinds of programs are needed to help achieve that goal.

The five policy alternatives were discussed in each of the three Panels, and each Panel developed extensive comments and recommendations based on the choice of system demonstrations as the correct

path for Federal policy. This information constitutes the substance of the preceding chapters.

On the evening of the second day of the Conference, each chairman, assisted by his rapporteur, drafted a summary of the major findings and recommendations emerging from Panel sessions. The chairmen and rapporteurs of the three Panels also met with Roland S. Homet, chairman of the next morning's plenary session, which would provide an overview and synthesis of the Conference.

The chairmen discussed the degree to which each Panel favored system demonstrations as the recommended policy alternative. They also discussed a number of other major issues and themes that had emerged from the discussions. Prominent among these was the recommendation of Panel II that demonstrations should extend over a 5-year period and the problem of institutional coordination and leadership for demonstrations that had been discussed in Panels II and III.

The next morning, the chairmen of each Panel reported to the Conference as a whole the discussions and recommendations that had emerged from his Panel. Chairman Homet then summarized the proposed Conference recommendations. As stated by Homet:

> The questions before this Conference are, first, should we endorse a demonstration project; and second, what do we suggest to the Congress by way of proceeding?
>
> On the basis of the Panel reports and of the discussion this morning, it seems fair to conclude that the Conference favors a carefully considered but immediately initiated program of demonstration projects. We recommend to Senators Talmadge and Magnuson that they propose to the President the following:
>
> - That he appoint a special adviser on new communications policy;
> - That he form an interagency committee on the coordination of communications policy and that one of its first tasks be to plan a system demonstration program for rural application; and,
> - That the nature and conditions of the demonstration program be as specified in this concluding Panel session and as further detailed in the written summaries prepared by each of the three Panel chairmen and rapporteurs.
>
> We recommend to the Senators that they then:
>
> - Establish a schedule of joint oversight committee hearings to monitor the progress of the executive branch in this matter;
> - Request that the planning group in the executive branch develop an inventory of administrative and regulatory obstacles to the demonstration program and present this inventory to the Congress along with draft legislation that would: (*a*) propose a method for overcoming the obstacles; and (*b*) include appropriate Federal authorizations and appropriations to carry the rural demonstrations for a period of 5 years of actual operation.
>
> If the congressional committees find these recommendations suitable, the Conference further recommends that the Conference Panel members be a source of advice available to the Office of Technology Assessment in its further work, the executive branch committee, and congressional committees as may be necessary.

Chairman Homet then called for discussion from the floor. Ira Kaye suggested the amendment that Federal appropriations and authorizations for each system demonstration cover a period of 5 years. This was incorporated into the final language of the Conference recommendations which has been quoted above.

No further amendments were suggested. The list above was adopted as the formal set of recommendations for the Conference. Thereafter, the Conference was adjourned by Chairman Homet.

## APPENDIX A

## REQUESTING LETTER FROM SENATOR TALMADGE

U.S. SENATE,
COMMITTEE ON AGRICULTURE AND FORESTRY,
*Washington, D.C., June 25, 1974.*

EMILIO Q. DADDARIO,
*Director, Office of Technology Assessment,*
*Washington, D.C.*

DEAR MR. DIRECTOR: For all of my career, I have been seriously concerned about the problem of equity for rural people. I have had some successes and some failures in dealing with this problem, but the fact remains that it is very difficult to deliver basic human services to people who live in low density circumstances in the American countryside.

Therefore, I was very excited to receive the enclosed good letter from Russell A. O'Neal, General Manager of the Wisconsin Electric Cooperative Association concerning the use of broadband two-way telecommunications in rural areas. As you will see from Mr. Kaye's enclosed paper on transportation of older Americans in rural areas, he suggests that some transportation of people in rural areas might be supplanted with just such a system.

I am also enclosing a copy of Rural Electric magazine which describes some of the activities which rural electric cooperatives are doing in regard to cable television, as well as the New Rural Society Project of Dr. Peter Goldmark. This material is on pages 12–20.

I also call your attention to a communications satellite which was launched recently that will be used to train rural paraprofessionals in Appalachia and the Rocky Mountain States, and then will be turned around to beam a signal to India. From what I have seen of this project, it was hastily conceived and launched before there was a clear understanding by anyone of what was to be accomplished. However, it is an example of the fact that communications can play an important role in reaching rural people, providing some types of services, educating, and informing.

I am aware that the FCC is still groping with the notion of what it wants cable television to be, and this indecision has caused delays in exploring the full potential of the concept of a "wired nation".

But it seems to me that we already are a wired nation. It is my understanding that with some modifications, lines which carry electricity can also carry television pictures. Therefore, it would appear that the rural electric systems which are already in place in rural areas could provide a vital new service for rural people at a limited cost.

However, it is not the intention of the rural electrics to capture all of cable television in rural areas. Many and perhaps most of these cooperatives may not want to get involved at all.

But for those which might want to get involved—for that matter, for any individual or group which might want to get involved, the potential for using communications technology as one of the components that make up the concept of broad-based rural community development is a new ballgame.

Therefore, I would appreciate it if OTA would consider a project to determine the feasibility and value of experimental efforts to develop public service for rural areas through the use of broadband communications techniques, whether cable or satellite.

If it would be helpful to your staff in determining whether to attempt this project, I would be pleased to put them in touch with Mr. Kaye, Dr. Goldmark, and the National Rural Electric Cooperative Association.

With every good wish, I am,

Sincerely,

HERMAN E. TALMADGE, *Chairman.*

## APPENDIX B

## TASKS AND QUESTIONS ADDRESSED BY EACH PANEL IN THE CONFERENCE ON COMMUNICATIONS AND RURAL AMERICA, NOVEMBER 15 TO 17, 1976

### PANEL I. RURAL DEVELOPMENT AND COMMUNICATIONS

*Task*

Examine present and probable future rural growth patterns and associated rural needs. Consider the present and probable future adequacy of public services and potential for economic diversification in rural areas. Examine the potential of communications technologies.

In performing this task, Panel I members might wish to consider the following:

1. Nearly 60 million people, including 40 percent of the Nation's poor, live in areas considered rural.
2. For the first time in this century, rural areas, taken as a whole, are growing faster than metropolitan areas, a trend unpredicted by most experts.
3. While rural areas generally are growing, the growth is uneven, with many (but a declining number) rural counties continuing to lose population.
4. Congress has established "balanced growth" as a national goal.

*Questions to be addressed*

1. What do we know about growth and decline of rural areas? What forces are attracting or driving people to move to rural areas? Who is making the move? Can we estimate the duration and extent of the movement? Should and can efforts be made to attract growth to or at least stem outmigration from declining rural areas?

2. Is the framework used in the OTA report—Turnaround Acceleration Counties, Turnaround Reversal Counties and Declining Counties—a useful way to describe what's happening in rural areas? Would it be useful to organize system demonstrations around the three basic categories of rural counties outlined in the report? How?

3. What services, in the broadest sense, do rural areas lack? Can an improved system of communications help deliver these needed services? What judgments can be made about whether communications is the best way to deliver such services?

4. What role can communications play in encouraging rural development? Beyond the question of delivering services to the people now living in rural areas, can communications play a role in attracting other kinds of growth to a rural area, and if so, what kinds of growth to what kinds of areas—industry, professional people, retirees, or recreational activities to a declining, static, or already growing area?

5. What role could Federal communications policy plan in improving the quality of life for rural people generally and in encouraging rural development? Do we know enough to define that role and how the Federal Government ought to pursue that role? If we do not know enough, is a systems demonstration, as outlined in the OTA report, the most useful way to develop the knowledge?

### PANEL II. TECHNOLOGY, ECONOMICS, AND SERVICES

*Task*

Examine the delivery of public, commercial, and entertainment services to rural areas from the standpoints of economic and technical feasibility. Consider communications alternatives to broadband systems in the delivery of such services and consider the role of transportation as an alternative to communications. Evaluate economic case study of Poinsett County, Ark.

*Questions to be addressed*

1. What are the current and long-term prospects—with or without assistance of the kind discussed in the OTA report—for the deployment of two-way interactive communications systems in low-density rural areas?

2. Four public services—education, health, law enforcement, and government/administrative—and four commercial services—security, information, data transmission, and pay television—were listed in the OTA report as having potential for inclusion in a multiservice communications system for use in rural areas. What other services—other than entertainment—might be included as candidates? For which of these services is there sufficient experimental evidence to suggest that they can be feasibly delivered by telecommunications? What economics data are available on delivery of such services by communications?

3. There are alternates to delivery of services by telecommunications—such as building more hospitals and busing students between schools. Which of these have been tried? How have they succeeded and failed? What lessons can be derived from these experiences which bear upon the likelihood that telecommunications could be a preferable approach to public service delivery and commercial use? Could transportation, telecommunications and other forms of communication—for example mail—be integrated into a total service delivery mechanism for rural areas?

4. A broad range of telecommunications technologies might be used singly or in combination to deliver public services, entertainment and to meet the needs of commercial users in rural areas. These include: Narrowband—for example telephone, translators, small broadcast stations, cable, satellite, microwave, and fiber optics. Given the need for service aggregation—that is, a multiservice system—and/or market aggregation to produce economic viability, which of these technologies, single or in combination, should be considered for system demonstrations?

5. How reliable are the equipment components of the type which might be used in system demonstrations? What can be said about their service life, maintenance requirements, and future unit cost?

6. What alternative telecommunications technologies that might be appropriately employed in rural systems are likely to reach the production stage in the near future—next 10 years? Is the near-term availability of such technologies—examples are fiber optics or household satellite antennas—such that system demonstrations should be delayed pending their development or designed with a view toward incorporating them in some selected demonstrations?

7. Are the system demonstrations contemplated in the OTA report likely to be useful in resolving uncertainties concerning economic feasibility, technological capability and appropriate services for delivery? If not, what alternative courses of action, if any, might be explored?

PANEL III. FEDERAL POLICY

*Task*

Identify and examine underlying assumptions and objectives which have given rise to current Federal communications policy toward rural areas, with emphasis on the degree to which the needs and interests of these areas have been considered in the setting of this policy. Present and possible future roles of Federal agencies in assisting in the development of the potential of rural telecommunications will be discussed and various scenarios by which their efforts might be made more effective will be evaluated.

*Questions to be addressed*

*(Federal Involvement in Development of Rural Telecommunications)*

1. What were the national objectives which gave rise to current Federal programs in rural communications, such as those concerned with the development of rural telephone systems? Are these national objectives being fully served by current programs? Should these programs be revised to include measures designed to improve rural access to advanced communications technologies?

2. What specific measures might be taken to enable rural areas to more fully share in modern communications technology? Would financial assistance on the model of REA loans be adequate? Might more direct involvement along the lines of federally assisted demonstration programs be more appropriate and effective?

3. How might alternative proposed Federal programs, ranging from funding assistance to system demonstrations, be organized? What agencies organized in what ways might be designated to carry out such functions?

4. What are the likely consequences of the positions being taken by the principal Federal agencies concerning improved rural access to modern communications technology? (See enclosed Chisman paper and separate enclosure of agency comments on OTA report.) Assuming no change in current Federal policy and programs, what is likely to be the outcome for rural areas?

(*Federal Regulation*)

1. To what extent have the interests of rural populations been the subject of explicit consideration in rulemaking?

2. Has the policy of localism adversely affected the provision of television broadcast service to rural areas and if so, are the benefits from that policy sufficient to warrant its preservation in light of new opportunities for diversity and service to rural areas, for example, cable; satellite broadcasting?

3. What policies might be adopted in the common carrier areas as to new specialized services, to promote efficient, low cost service in rural areas?

4. What rule revisions might be adopted to promote the concept of integrated rural television/telecommunications services?

5. What changes of regulatory institutions might help focus attention on rural telecommunications needs?

PANEL IV. OVERVIEW AND SYNTHESIS—ALL PANELISTS

One purpose of the questions to be addressed during the first 2 days of the Conference is to prepare participants to consider the implications of different policy options. Panelists should keep these policy options in mind during their deliberations on the first 2 days. On the 3d day, all three Panels will meet together to examine the pros, cons and probable consequences of at least the policy alternatives identified below. In this examination, the Chairman and Rapporteurs of the three Panels will be the principal discussants.

*Policy options*

1. Congress should take no further action regarding broadband communication service in rural areas; this option is continuation of the status quo.

2. Congress should waive some or all Federal regulations which now inhibit growth of cable television in rural areas to learn what kinds of systems will develop "on their own."

3. Congress should adopt a policy goal of facilitating development of telecommunications in rural areas, and then explore further what kinds of programs are needed to help achieve that goal.

4. Congress should adopt a program, such as providing low-interest loans for stringing cable television lines (similar to the Rural Electrification Act) to encourage development of cable television in rural areas.

5. Congress should fund a series of demonstration projects (similar to or different from the approach outlined in the OTA report) to determine what kinds of services broadband communications technology can help deliver to rural areas and what long-term role, if any, the Federal Government should play in developing such a capability.

## APPENDIX C

## RESOURCE PAPERS FOR THE CONFERENCE ON COMMUNICATIONS AND RURAL AMERICA

### PAPERS FOR PANEL I. RURAL DEVELOPMENT AND COMMUNICATIONS

Beale, Calvin L., Economic Research Service, U.S. Department of Agriculture, "A Further Look at Nonmetropolitan Growth Since 1970."

Cirillo, Marie, Catholic Diocese of Nashville, "Rural Development: Possibilities for Those Areas of Our Country That Are Chronically Poor."

Kytle, Calvin, Calvin Kytle Associates—Paper prepared at the request of the National Rural Center—"Broadband Communications for Rural Development."

Marshall, Ray, National Rural Center, "Communications and Rural Development."

Newlin, Larry—Paper prepared at the request of the National Rural Center—"Intended Role of Communications in Rural Development—Legislative Analysis."

Rainey, Kenneth D., Academy for Contemporary Problems, "Forces Influencing Rural Community Growth."

### PAPERS FOR PANEL II. TECHNOLOGY, ECONOMICS, AND SERVICES

Hull, Joseph A., Office of Telecommunications, Department of Commerce, "Fiber Optic Communications Technology."

Lyall, Katherine, and Duncan, Ronald, Lyall Associates, "Design and Evaluation of a Demonstration Rural Telecommunications System for Poinsett County, Ark."

Staff, Office of Telecommunications Policy, "Communications in Rural America."

Staff, Office of Telecommunications Policy, "Review of Representative Public Service Experiments as They Apply to Rural Telecommunications."

### PAPERS FOR PANEL III. FEDERAL POLICY

Chisman, Forrest, Aspen Institute for Humanistic Studies, "Options for Federal Role with Regard to Advanced Telecommunications Systems and Services."

Geller, Henry, Aspen Institute for Humanistic Studies, "Federal Regulatory Policies, Their Implications and Effects on Rural Communications."

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